

## CLAIMS

1. An aqueous dispersion, comprising:

- a) an amorphous urethanized, unsaturated polyester resin,
- b) a nonvolatile content of from 20% to 60% by weight,
- c) from 0 to 60% by weight of a solvent,
- d) a pH of between 5.0 and 9.5, and
- e) a viscosity at 20°C of from 20 to 500 mPas,

wherein said polyester resin is obtained from

I. an alcohol component,

II. i) from 20 to 100 mol% of an  $\alpha,\beta$ -unsaturated carboxylic acid component,  
and

ii) from 0 to 80 mol% of a further carboxylic acid component, and

III. at least one isocyanate component,

wherein the alcohol component comprises a dicidol mixture of the isomeric compounds 3,8-bis(hydroxymethyl)tricyclo[5.2.1.0<sup>2,6</sup>]decane, 4,8-bis(hydroxymethyl)-tricyclo[5.2.1.0<sup>2,6</sup>]decane and 5,8-bis(hydroxymethyl)tricyclo[5.2.1.0<sup>2,6</sup>]decane,

wherein each isomer is present in a fraction of from 20 to 40% in the dicidol mixture,

wherein the sum of the three isomers in the dicidol mixture is from 90 to 100%, and

wherein the dicidol mixture is present from 10 to 100 mol% in the alcohol component of the polyester.

2. The aqueous dispersion as claimed in claim 1, wherein the alcohol component further comprises up to 10% of additional isomers of dicidol, trimeric isomeric diols of the

Diels-Alder reaction product of cyclopentadiene, higher isomeric diols of the Diels-Alder reaction product of cyclopentadiene or mixtures thereof.

3. The aqueous dispersion as claimed in claim 1, wherein at least 20 mol% of the  
5 alcohol component comprises didiol.

4. The aqueous dispersion as claimed in claim 1, wherein at least 30 mol% of the alcohol component comprises didiol.

10 5. The aqueous dispersion as claimed in claim 1, wherein at least 60 mol% of the alcohol component comprises didiol.

6. The aqueous dispersion as claimed in claim 1, wherein at least 100 mol% of the alcohol component comprises didiol.

15 7. The aqueous dispersion as claimed in claim 1, wherein the alcohol component further comprises not more than 90 mol% of at least one member selected from the group consisting of linear diols, branched diols, aliphatic diols, cycloaliphatic diols, aromatic diols, linear polyols, branched polyols, aliphatic polyols, cycloaliphatic polyols, aromatic polyols  
20 and mixtures thereof.

8. The aqueous dispersion as claimed in claim 1, wherein the alcohol component further comprises a compound selected from the group consisting of ethylene glycol, 1,2-propanediol, 1,3-propanediol, diethylene, dipropylene, triethylene glycol, tetraethylene  
25 glycol, 1,2-butanediol, 1,4-butanediol, 1,3-butylethylpropanediol, 1,3-methylpropanediol,

1,5-pentanediol, cyclohexanedimethanol, glycerol, hexanediol, neopentylglycol, trimethylolethane, trimethylolpropane, pentaerythritol, bisphenol A, bisphenol B, bisphenol C, bisphenol F, norbornylene glycol, 1,4-benzylidimethanol, 1,4-benzyl-diethanol, 2,4-dimethyl-2-ethylhexane-1,3-diol, and mixtures thereof.

5

9. The aqueous dispersion as claimed in claim 1, wherein the  $\alpha,\beta$ -unsaturated acid component comprises at least one compound selected from the group consisting of citraconic acid, fumaric acid, itaconic acid, maleic acid, mesaconic acid and mixtures thereof.

10

10. The aqueous dispersion as claimed in claim 1, wherein the  $\alpha,\beta$ -unsaturated acid component comprises at least one compound selected from the group consisting of fumaric acid, maleic acid, fumaric acid anhydride, maleic acid anhydride and mixtures thereof.

15

11. The aqueous dispersion as claimed in claim 1, wherein the further acid component comprises at least one compound selected from the group consisting of aromatic monocarboxylic acids, aliphatic monocarboxylic acids, cycloaliphatic monocarboxylic acids, aromatic dicarboxylic acids, aliphatic dicarboxylic acids, cycloaliphatic dicarboxylic acids, aromatic polycarboxylic acids, aliphatic polycarboxylic acids, cycloaliphatic polycarboxylic acids and mixtures thereof.

20

12. The aqueous dispersion as claimed in claim 11, wherein the further acid component comprises at least one member selected from the group consisting of phthalic acid, isophthalic acid, terephthalic acid, 1,4-cyclohexanedicarboxylic acid, succinic acid, sebacic acid, methyltetrahydrophthalic acid, methylhexahydrophthalic acid, hexahydrophthalic acid, tetrahydrophthalic acid, dodecanedioic acid, adipic acid, azelaic acid,

25

pyromellitic acid, trimellitic acid, anhydride of phthalic acid, anhydride of isophthalic acid, anhydride of terephthalic acid, anhydride of 1,4-cyclohexanedicarboxylic acid, anhydride of succinic acid, anhydride of sebacic acid, anhydride of methyltetrahydrophthalic acid, anhydride of methylhexahydrophthalic acid, anhydride of hexahydrophthalic acid, anhydride of tetrahydrophthalic acid, anhydride of dodecanedioic acid, anhydride of adipic acid, anhydride of azelaic acid, anhydride of pyromellitic acid, anhydride of trimellitic acid, methylesters of phthalic acid, methylesters of isophthalic acid, methylesters of terephthalic acid, methylesters of 1,4-cyclohexanedicarboxylic acid, methylesters of succinic acid, methylesters of sebacic acid, methylesters of methyltetrahydrophthalic acid, methylesters of methylhexahydrophthalic acid, methylesters of hexahydrophthalic acid, methylesters of tetrahydrophthalic acid, methylesters of dodecanedioic acid, methylesters of adipic acid, methylesters of azelaic acid, methylesters of pyromellitic acid, methylesters of trimellitic acid, isononanoic acid, 2-ethylhexanoic acid and mixtures thereof.

13. The aqueous dispersion as claimed in claim 12, wherein the further acid component comprises at least one member selected from the group consisting of adipic acid, phthalic acid, adipic acid anhydride, phthalic acid anhydride and mixtures thereof.

14. The aqueous dispersion as claimed in claim 1, wherein the acid component comprises in whole or in part at least one member selected from the group consisting of anhydrides, alkyl esters and mixtures thereof.

15. The aqueous dispersion as claimed in claim 1, comprising the alcohol component of the polyester resin in a molar ratio of from 0.5 to 2.0:1 with respect to the acid component.

16. The aqueous dispersion as claimed in claim 1, comprising the alcohol component of the polyester resin in a molar ratio of from 0.8 to 1.5:1 with respect to the acid component.

17. The aqueous dispersion as claimed in claim 1, comprising the alcohol component of the polyester resin in a molar ratio of from 1.0 to 1.3:1 with respect to the acid component.

18. The aqueous dispersion as claimed in claim 1, wherein the polyester resin has an acid number of between 1 and 200 mg KOH/g.

19. The aqueous dispersion as claimed in claim 1, wherein the polyester resin has an OH number of between 1 and 200 mg KOH/g.

20. The aqueous dispersion as claimed in claim 1, wherein said isocyanate component comprises a polyisocyanate, a diisocyanate or mixtures thereof.

21. The aqueous dispersion as claimed in claim 20, wherein the amorphous unsaturated polyester additionally contains a further polyol component for urethanization.

22. The aqueous dispersion as claimed in claim 1, wherein said isocyanate is an aromatic diisocyanate, an aliphatic diisocyanate, a cycloaliphatic diisocyanate or mixtures thereof.

23. The aqueous dispersion as claimed in claim 1, wherein said isocyanate is at least one member selected from the group consisting of isophorone diisocyanate, hexamethylene diisocyanate, 4,4'-methylenebis(cyclohexyl diisocyanate) and mixtures thereof.

24. The aqueous dispersion as claimed in claim 21, wherein the further polyol component is a bishydroxyalkylcarboxylic acid.

5           25. The aqueous dispersion as claimed in claim 1, further comprising auxiliaries and additives.

26. The aqueous dispersion as claimed in claim 1, further comprising auxiliaries and additives selected from the group consisting of inhibitors, neutralizing agents, surfactants, oxygen scavengers, free-radical scavengers, catalysts, light stabilizers, color brighteners, photosensitizers, thixotropic agents, antiskinning agents, defoamers, antistats, thickeners, thermoplastic additives, dyes, pigments, flame retardants, internal release agents, fillers, blowing agents and mixtures thereof.

15           27. The aqueous dispersion as claimed in claim 1, wherein the alcohol component of the unsaturated amorphous polyester resin comprises at least 80% dicidol mixture, and wherein the acid component comprises at least one component selected from the group consisting of fumaric acid, maleic acid, fumaric acid anhydride, maleic acid anhydride and mixtures thereof.

20           28. The aqueous dispersion as claimed in claim 1, wherein the amorphous urethanized, unsaturated polyester resin further comprises at least one unit selected from the group consisting of adipic acid, phthalic acid, adipic acid anhydride, phthalic acid anhydride and mixtures thereof as acid component, in a ratio of  $\alpha,\beta$ -unsaturated acid to additional acid  
25 of from 3:1 to 1:4.

29. The aqueous dispersion as claimed in claim 1, wherein at least a part of the acid groups of the urethanized, unsaturated amorphous polyester resin have been neutralized.

5           30. The aqueous dispersion as claimed in claim 1, wherein at least one member selected from the group consisting of an amine, an inorganic hydroxide solution and mixtures thereof is used for the neutralization.

31. The aqueous dispersion as claimed in claim 1, wherein the degree of  
10   neutralization is between 0.3 and 1.2.

32. A process for preparing an aqueous dispersion of an amorphous urethanized, unsaturated polyester resin, comprising:

          reacting an alcohol component I and an acid component II at a temperature of from  
15   150 to 270°C, to obtain a product,

          urethanizing said product by reacting with an isocyanate component III, to obtain a polyester resin, and

          dispersing the polyester resin, following neutralization, into the aqueous phase, to obtain said dispersion;

20           wherein said dispersion comprises

- a)     said amorphous urethanized, unsaturated polyester resin,
- b)     a nonvolatile content of from 20% to 60% by weight,
- c)     from 0 to 60% by weight of a solvent,
- d)     a pH of between 5.0 and 9.5, and
- 25     e)     a viscosity at 20°C of from 20 to 500 mPas,

wherein acid component of said polyester resin comprises

i) from 20 to 100 mol% of an  $\alpha,\beta$ -unsaturated carboxylic acid component,

and

ii) from 0 to 80 mol% of a further carboxylic acid component,

5        wherein the alcohol component comprises a didiol mixture of the isomeric compounds 3,8-bis(hydroxymethyl)tricyclo[5.2.1.0<sup>2,6</sup>]decane, 4,8-bis(hydroxymethyl)-tricyclo[5.2.1.0<sup>2,6</sup>]decane and 5,8-bis(hydroxymethyl)tricyclo[5.2.1.0<sup>2,6</sup>]decane,

wherein each isomer is present in a fraction of from 20 to 40% in the didiol mixture,

wherein the sum of the three isomers in the didiol mixture is from 90 to 100%, and

10        wherein the didiol mixture is present from 10 to 100 mol% in the alcohol component of the polyester.

33. The process as claimed in claim 32, wherein the reaction of components I and II takes place at a temperature of from 160 to 230°C.

15

34. The process as claimed in claim 32, wherein the reaction takes place in an inert gas atmosphere.

35. The process as claimed in claim 32, wherein the inert gas has an oxygen content  
20 of less than 50 ppm.

36. The process as claimed in claim 32, wherein the amorphous urethanized, unsaturated polyester resin is dispersed in water using an organic auxiliary solvent.



37. The process as claimed in claim 36, wherein the organic auxiliary solvent is removed by distillation.